



Opportunities and Challenges in Pakistan's Telecommunications Industry: A Quantitative Analysis

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ABSTRACT

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Pakistan's telecommunications sector has grown significantly over the past 20 years, but maintaining this progress remains difficult due to economic, regulatory, and infrastructure constraints. This study examines the main reasons the telecom industry in Pakistan has slowed and offers practical suggestions for sustainable growth. The research uses a quantitative approach, gathering data from structured questionnaires given to telecom professionals and analyzing telecom growth trends from 2005 to 2023. Results show that about 42% of respondents said the industry is growing at a moderate pace, but sometimes slows down. About 55% think market saturation is partly to blame, even though there are still opportunities for growth. Most respondents (65%) cited high taxes, currency devaluation, rising costs, and a lack of investment as the main challenges. The study also found that 53% see the industry as only moderately competitive, with little difference between companies. Meanwhile, 75% believe that updating infrastructure, changing regulations, lowering taxes, and expanding digital services are key to future growth. Industry data show that the number of cellular subscribers grew from 33.9 million in 2005–2006 to 197.04 million in 2022–2023. Telecom revenue also increased from PKR 194.9 billion to PKR 572 billion over the same period. However, growth has slowed in recent years because of regulatory challenges, higher costs, and limited investment. The study finds that policy reforms, investment in new technologies like 5G and Fiber-optic networks, and long-term infrastructure development are needed to strengthen Pakistan's telecommunications industry and support its digital transformation.

Keywords: Pakistan Telecom Sector, Digital Infrastructure; Market Saturation; Regulatory Challenges; Telecommunications Growth, Govt Policies

1. INTRODUCTION

The telecommunications industry is a foundational sector that enables global connectivity, drives digital transformation, and supports economic growth (Kavak & Rusu, 2025). Sustained success in this sector relies on technological innovation, robust regulatory frameworks, significant financial investment, a strong customer focus, and ongoing advancement (Hamdouna & Khmelyarchuk, 2025). A 2024 report by Mordor Intelligence estimates Pakistan's market size at USD 4.52 billion, with the potential to reach USD 5.32 billion by 2029.

However, these projections are primarily based on historical market trends and provide limited discussion regarding the structural, regulatory, and economic factors that may influence future growth of the telecom sector in Pakistan (Sehrawat et al., 2025). Effective policy formulation, adaptation, implementation, and evaluation are critical for sustainable growth at both the industrial and national levels (Xue et al., 2018). Policymakers frequently emphasize formulation and adaptation, often overlooking implementation and evaluation, thereby undermining the intended outcomes of policies or regulations. Several researchers have demonstrated a strong relationship between public policy and economic growth in Pakistan (Dogar & Khalid, 2024), and the telecommunications sector is affected.

The telecommunication industry in Pakistan has experienced significant growth, marked by rapid expansion and technological progress (Imtiaz et al., 2015; Sarfraz et al., 2022). Despite these advancements, shortcomings in policymaking and regulatory processes have hindered the industry's sustained development. Inadequate regulation and insufficient investment in infrastructure have contributed to a decline in service quality among operators (Ali & Maelah, 2025). Many scholars recognize major technological advancements and some have criticized government policies that affect different industries. Still, few have focused on telecom operators' concerns or on how new regulations affect the telecommunications sector.

The study examines how changes in various factors and sudden regulatory shifts have shaped the telecom industry's growth. In the early years, positive growth was driven by regulatory actions, including improved infrastructure, greater competition and higher operator revenue. Together, these factors supported strong sector growth and technological progress. Over the past few years, the industry has faced several major obstacles. Some of the main challenges are regulatory burdens, currency volatility, multi-tier taxation, infrastructure site-locking, social media restrictions, and complex documentation requirements. These issues have led to slow growth, fewer business opportunities, and less Foreign Direct Investment (FDI).

There are important questions to consider in this research: Will Pakistan's telecom industry continue to grow despite its challenges? How has it changed over the last twenty years? What is slowing its progress? This paper looks at these questions by reviewing data on the sector's growth in Pakistan. It also examines how operational costs, foreign investment, shifts in consumer and market trends and government policies influence the industry's development. The study examines the factors that affect the industry's growth, with a focus on the challenges unique to Pakistan's telecom sector. It then uses statistical analysis to study key trends. Based on these results, the paper suggests recommendations and possible steps to support the future growth of the telecom sector.

2. LITERATURE REVIEW

2.1 Historical Development of Pakistan's Telecom Industry

The deregulation of Pakistan's telecommunications sector commenced with the Cabinet's approval of the Mobile Policy on January 10, 2004 (Ministry of Information Technology & Telecommunication, 2004). The policy sought to optimize radio spectrum efficiency, broaden consumer choice through competitive pricing, and attract private investment. Its primary objectives included clarifying the rights and obligations of mobile operators, promoting fair competition between mobile and fixed-line providers, and developing a regulatory framework consistent with international standards.

A significant milestone of this reform was the formal designation of the telecommunications sector as an "Industry" which established the legal and financial basis for its subsequent growth (Imtiaz et al., 2015; Agiwal et al., 2016). Pakistan Telecommunication Authority (PTA) effectively managed and auctioned spectrum licenses, enabling telecom operators to expand and enhance their network infrastructure. This led to better coverage, higher capacity, and improved service quality nationwide (Ministry of Information Technology & Telecommunication 2018).

Figure 1 illustrates the historical growth of the telecommunications sector and the corresponding spectrum allocation from 1990 to 2026. First spectrum offered in 2004 consisted of two lots, each with a configuration of 13.6MHz x2. Specifically, there were 4.8 MHz x2 in the 900 MHz band and 8.8 MHz x2 in the 1800 MHz band. The spectrum in the 900MHz band was valued at 2.5 times the spectrum in the 1800MHz band. Payment terms required a 50% advance payment, with the remaining balance payable over 10 years, later relaxed. The auction concluded with a winning bid of USD 291 million per lot, totaling USD 582 million. Telenor and Warid emerged as the winners of the licenses (Imtiaz et al., 2015; Ministry of Information Technology & Telecommunication 2018).

In 2014, there was a technological boom in the telecom sector when Zong launched 4G, becoming Pakistan’s first 4G operator. Later on, auctions of spectrum licenses were held in 2016, 2017, and 2021, in which Telenor, Jazz, and Ufone emerged as winners, respectively. The following auction for the 5G spectrum is tentatively planned for March 2025.

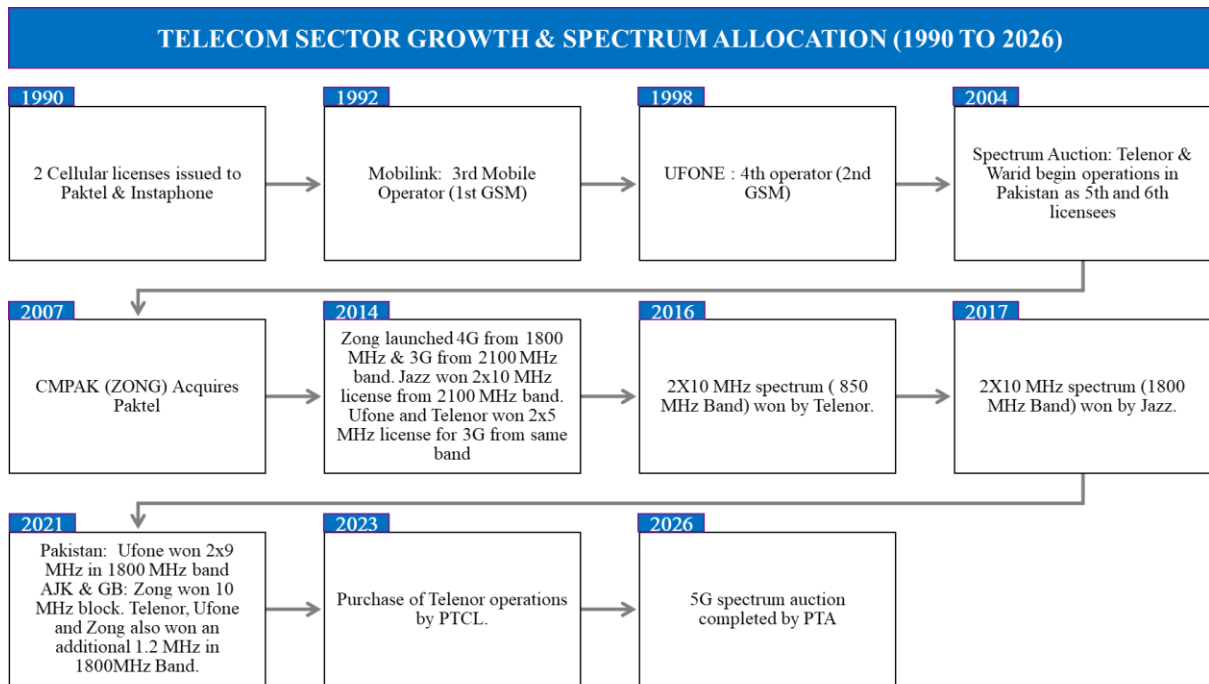


Figure 1: Telecom Sector Growth (1990-2026)

The Infrastructure Sharing Framework and Digital Pakistan Policy (2021) were two other important steps towards the telecom sector's growth (Jabeen et al., 2024).

To promote efficient resource utilization, cost reduction, and enhanced service quality, Ministry of Information Technology & Telecommunication (2018) planned a framework for Telecom infrastructure sharing to encourage telecom operators to share passive and active infrastructures. Governed by the Pakistan Telecommunication Authority (PTA), the framework mandated transparent and non-discriminatory sharing agreements, facilitating voluntary operator collaboration while ensuring compliance through regular monitoring and dispute resolution mechanisms. Digital Pakistan Policy was also another game-changing Telecom and IT sector policy (Pakistan Telecommunication Authority, 2024).

The digital Pakistan policies primarily focused on the information technology sector, but projects such as e-governance, e-commerce, e-payments, telemedicine, and cloud-based public services also relied on a robust telecommunications infrastructure. Many of these goals have not been achieved in Pakistan due to inconsistent government policies, regulatory uncertainty, frequent internet shutdowns, ongoing energy shortages, and limited infrastructure investment. Even with these issues, these projects have still helped the telecom sector grow and modernize.

2.2 Porter's Diamond & Industry Life Cycle

Porter's Diamond Model outlines how national competitive advantage and industrial growth are shaped by interconnected factors, including factor conditions, demand conditions, firm strategy and rivalry, related and supporting industries, government policies, and chance events (Porter, 1990). This model is frequently applied to assess the competitiveness and development potential of industries within a nation.

The model presented in Figure 2 explains the significant factors influencing changes in industry growth. In this model, "Chance" refers to random events such as natural disasters that may affect industry dynamics. "*Demands or conditions*" refer to evolving customer needs and the need for technological advancements. "Government" encompasses policy frameworks or regulations established by governmental entities. The Industry Lifecycle Model identifies four distinct stages in an industry's development: Birth, Growth, Maturity, and Decline. This framework facilitates analysis of whether Pakistan's industry is currently in the "Maturity" or "Decline" phase, which constitutes a central theme of this research.

Many Asian countries have introduced various strategies to encourage private-sector investment. One approach was to auction licenses to private companies so they could provide both basic wired and wireless telecommunications services nationwide. To make licensing easier, the region was divided into administrative areas or telecom circles (McDowell, 2003). This approach aligns with research on how market structure and telecommunications interact (Jerbashian, 2015). The telecommunication sector requires substantial capital investment to build and maintain infrastructure, especially in rural or remote areas. The rising costs associated with deploying advanced networks often lead to higher prices for consumers and pose significant challenges for service providers. Economic downturns further exacerbate these issues, as companies may reduce capital expenditures, leading to aging equipment and delayed network upgrades.

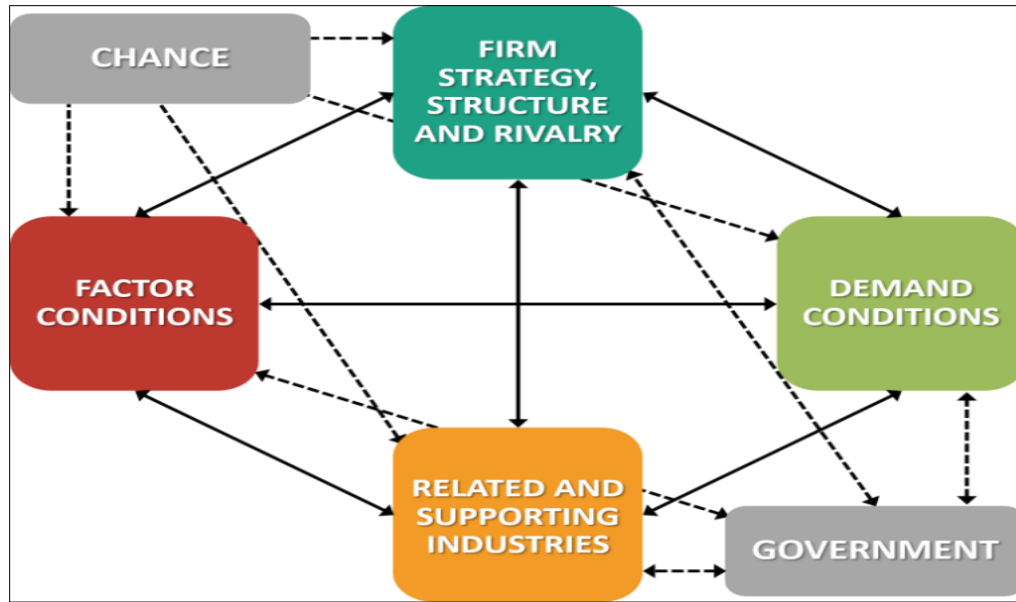


Figure 2: Porter's Diamond Model (Porter, 1990)

As more people use data and stay connected, telecom providers are struggling to keep up with demand. In Pakistan, these problems are exacerbated by ongoing energy shortages and volatile oil prices, which raise operating costs. Maintaining network uptime during frequent power outages necessitates a heavy reliance on backup power and diesel generators, making the industry highly sensitive to fuel costs. When power and fuel resources are exhausted, tower shutdowns occur, resulting in widespread communication blackouts and internet disruptions that hinder the country's digital and economic progress. These energy-related blockages, combined with site locking and high electricity billing, contribute to stagnant growth and declining profitability across the sector. Telecom operators have to navigate a complex web of regulations and compliance requirements, which can vary significantly across regions. Adhering to these regulations while maintaining operational efficiency is a constant challenge. And failing to comply with said norms makes a company subject to legal consequences with heavy fines and, in some cases, a complete cease of operations. This can be done through diversification of services. IoT adoption is also growing but hindered by technical and business constraints, limiting its revenue growth.

A robust partner ecosystem is essential for enabling scalable enterprise Internet of Things (IoT) solutions over the next five years. IoT devices present diverse network requirements, including efficiency, scalability, and low latency. Telecommunications companies are collaborating with specialized firms to enhance network capabilities in response to evolving industry demands (Nguyen et al., 2021). According to A series of policies were implemented to reinforce the foundation of the telecommunications sector at various stages of its development, including the Deregulation Policy (2003), Mobile Cellular Policy (2004), Broadband Policy (2004), Universal Service Fund (USF) Policy (2012), and Telecommunication Policy (2015). These policies and associated leadership strategies have significantly influenced the trajectory of the national telecommunications industry (Sarfraz et al., 2022). Rising operational expenditures, declining revenues, high taxation, frequent internet shutdowns and slowdowns, and reduced investment represent significant barriers to growth. According to the Development Asia report, Pakistan is identified as the most

spectrum-starved country, with the economic cost of internet closures estimated at 1.3 billion per day (Bhutta, 2025; Haque & Najib, 2023).

3. METHODOLOGY

3.1 Research Design

This study employs a quantitative research design to analyze numerical data and evaluate trends within Pakistan's telecommunications sector across various time periods. This methodology enables statistical comparison of key industry factors, including cellular subscribers, tele-density, and revenue to determine their specific effects on sectoral growth. Through quantitative analysis, the research provides an objective evaluation of the influence of variables, including currency devaluation, high taxation, and operational costs on the industry's development.

3.2 Population and Sampling

The study focused on industry professionals currently working in Pakistan's telecom sector. Using purposive sampling, 40 respondents were selected with high levels of leadership experience. The sample included 70% male and 30% female participants and 55% had 5-20 years of industry experience.

3.3 Data Collection and Questionnaire Distribution

We collected data using a structured questionnaire and selected professionals in all major mobile operators of Pakistan including Jazz, PTCL, Telenor, Ufone & Zong. The survey used a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure respondents' agreement with statements about factors that hinder industry growth. To make sure the data was reliable, industry experts and academics reviewed the questionnaire for content, and we ran a pilot study to remove any unclear or repetitive questions before finalizing it.

3.4 Data Sources and Instrumentation

This research uses both primary and secondary data sources for a thorough analysis. Secondary quantitative data on growth from 2003 to 2023 were sourced from reliable industry sources to illustrate historical trends. Excel was used as main tool for validated questionnaire with closed-ended and Likert-scale questions, designed to explore market saturation, regulatory environments and economic challenges.

4. RESULT AND DISCUSSION

4.1 Demographic Result

Table 1 shows that most respondents were male (70%), which reflects the usual gender balance in the telecommunications industry. Most participants worked in mid-level (43%) or intermediate-level (35%) positions, indicating they were actively involved in their organizations. The majority also had less than 10 years of industry experience (80%), so early- and mid-career professionals were well represented.

Table 1: Demographics of Survey (N=40)

Item	Category	Frequency	Percentage (%)
Gender	Female	12	30
	Male	28	70
Career Level	Entry-level	2	5.0
	Intermediate	14	35
	Mid-level	17	43
	Senior or executive-level	7	18
Experience in Telecom Industry	<5 Years	18	45
	5-10 Years	14	35
	10-15 Years	6	15
	15-20 Years	2	5.0

4.2 Growth Factors in Pakistan's Telecom Industry

Table 2 show that most respondents perceived Pakistan's telecom industry as experiencing moderate growth with occasional stagnation (42%), while 55% believed market saturation partially contributes to industry stagnation despite remaining growth opportunities. A majority of respondents (65%) identified economic challenges collectively, including currency devaluation, high taxation, and lack of investment, as major barriers to sector growth. Furthermore, 53% described the industry as moderately competitive with limited differentiation among operators, and 75% emphasized that comprehensive policy reforms, infrastructure investment, and rural expansion are necessary to support sustainable telecom sector growth.

Table 2: Respondents' Perceptions of Growth Factors in Pakistan's Telecom Industry (N=40)

Research Question	Response	Frequency	Percentage (%)
How would you describe the current state of the telecom industry in Pakistan?	Stagnation with little to no growth	8	20
	Declining each year	6	15
	Moderate growth with occasional stagnation	17	42
	Strong growth with clear progress	9	23
Is market saturation a key factor in the stagnation of telecom industry growth in Pakistan?	Yes, the market is saturated, especially in urban areas	12	30
	Partially, but there are still growth opportunities	22	55
	No, there is still significant untapped potential	5	13
What are the most significant economic challenges Pakistan's telecom industry faces?	I do not think market saturation is an issue	1	3
	Currency devaluation and rising costs	5	13
	High taxation and regulatory fees	6	15
	Lack of Foreign & Local Investment	3	8
	All of the above	26	65

How would you describe the competitive landscape in Pakistan's telecom industry?	Moderately competitive, with limited differentiation among operators	21	53
	Competitive, but leading to unsustainable price wars	8	20
	Highly competitive, driving innovation	11	28
The regulatory environment in Pakistan has significantly hindered the growth of the telecom sector.	Strongly Agree	1	3
	Agree	2	5
	Neutral	12	30
	Disagree	16	40
	Strongly Disagree	9	23
The telecom infrastructure in Pakistan requires significant upgrades and investment to meet current and future demand.	Strongly Agree	1	3
	Agree	1	3
	Neutral	8	20
	Disagree	12	30
	Strongly Disagree	18	45
The delayed rollout of advanced technologies, such as 4G and 5G, has been a significant factor in limiting the growth of Pakistan's telecom industry.	Strongly Agree	1	3
	Agree	5	13
	Neutral	11	28
	Disagree	8	20
	Strongly Disagree	15	38
The shift in consumer demand for cheaper services has negatively impacted the profitability of telecom operators in Pakistan.	Strongly Agree	1	3
	Agree	8	20
	Neutral	14	35
	Disagree	15	38
	Strongly Disagree	2	5
What government support is most needed to encourage growth in the telecom sector?	Investment in 5G and digital infrastructure	3	8
	Reduced taxation and regulatory reforms	4	10
	Expanding telecom services to rural and underserved areas	3	8
	All of the above	30	75

4.3 Economic Challenges the Unbearable Burdens

Table 2 findings shows that 65% of respondents see high taxes and regulatory fees, currency devaluation, rising costs, and limited investment as the main challenges for Pakistan's telecom industry. Telecom operators in Pakistan face several types of taxes, including sales Tax, customs duties, spectrum fees, license charges, and universal service contributions. These combined costs make it harder for them to operate. High taxes and regulatory expenses can also reduce investment in infrastructure and slow down the digital economy's growth.

The CEO of Jazz, Pakistan's leading telecom operator, has often spoken out against the heavy tax burden on the industry. Consumers pay a 34.5% tax on recharges, while the company faces a 29% corporate tax plus an extra super tax, which directly reduces profits. Together, these taxes mean the government takes about half of the telecom sector's total earnings, making it much harder for digital growth to take off.

The regulatory environment directly impacts the growth of the telecom sector in Pakistan. A survey showed that almost 62% (40% agreed and 23% strongly agreed) of respondents think that the regulatory environment in Pakistan has significantly hindered this growth. New technologies such as 5G, artificial intelligence (AI), and the Internet of Things (IoT) are accelerating digital transformation in the telecom industry. These tools do more than just improve connectivity. They enable the creation of smart cities, self-driving cars, and better remote healthcare. For telecom companies, keeping up with these changes is essential.

In Pakistan, 75% of respondents strongly believe that major upgrades and investments are needed for telecom infrastructure to keep up with current and future needs. Additionally, 58% agree or strongly agree that delays in rolling out advanced technologies like 4G and 5G have slowed the industry's growth. The survey results in Table 2 show that 73% of professionals believe that customer demand for lower prices has hurt profitability. On the other hand, 7% feel the market is only partly saturated and see room for growth.

Earlier rulings show that the government has played a limited role in supporting growth in Pakistan's telecom sector. Recently, the FBR announced it would enforce tax compliance by blocking the SIM cards of individuals who have not filed taxes. Telecom operators resisted this move, saying it would hurt their revenue, but enforcement still went ahead. The Islamabad High Court (IHC) stopped the FBR, stating that the government cannot block SIM cards by changing laws. The court also noted that blocking over 500,000 SIMs could cost the telecom sector Rs 1 billion in annual revenue.

4.4 Pakistan Telecom Growth

Table 3 and Figure 1 show how Pakistan's telecom sector grew from 2005 to 2023. During this time, there was a strong rise in cellular subscribers, tele-density, telecom revenue, and cell sites, showing rapid growth in digital communication. The industry grew fastest between 2005 and 2010, especially in subscribers and infrastructure. Growth slowed from 2010 to 2015, likely due to market saturation and economic challenges. After 2015, the sector continued to expand, supported by more mobile users, higher demand for digital services, and new infrastructure investments.

Table 3: Data for Growth Analysis

Year	Cellular Subscribers (Million)	Cellular Tele density (%)	Telecom Revenue (PKR Billions)	Cell Sites
2005-2006	33.9	22.2	194.9	8,705
2006-2007	63.2	40.9	235.6	13,725
2007-2008	88	54.7	278.5	21,518
2008-2009	94.3	58.2	333.8	28,159
2009-2010	99.2	60.4	344.21	30,126
Duration Growth (2005-2010)	193%	172%	77%	246%
2010-2011	108.89	64.8	362.9	31,303
2011-2012	120.15	68.39	409.2	33,920
2012-2013	128.93	71.7	439.5	35,889
2013-2014	139.97	76.6	463.5	37,576
2014-2015	114.7	60.7	449.6	40,705
Duration Growth (2010-2015)	5%	-6%	24%	30%
2015-2016	133.24	68.4	457	41,931
2016-2017	142.8	70.9	476.3	40,626
2017-2018	153.1	72.8	448.8	41,899
2018-2019	166.74	76.5	550.4	45,171
2019-2020	173.65	78.8	537.2	47,251
Duration Growth (2015-2020)	30%	15%	18%	13%
2020-2021	189.86	81.1	462	48,958
2021-2022	200.46	83.5	501	52,565
2022-2023	197.04	80.3	572	54,415
Duration Growth (2021-2023)	13%	2%	6%	15%

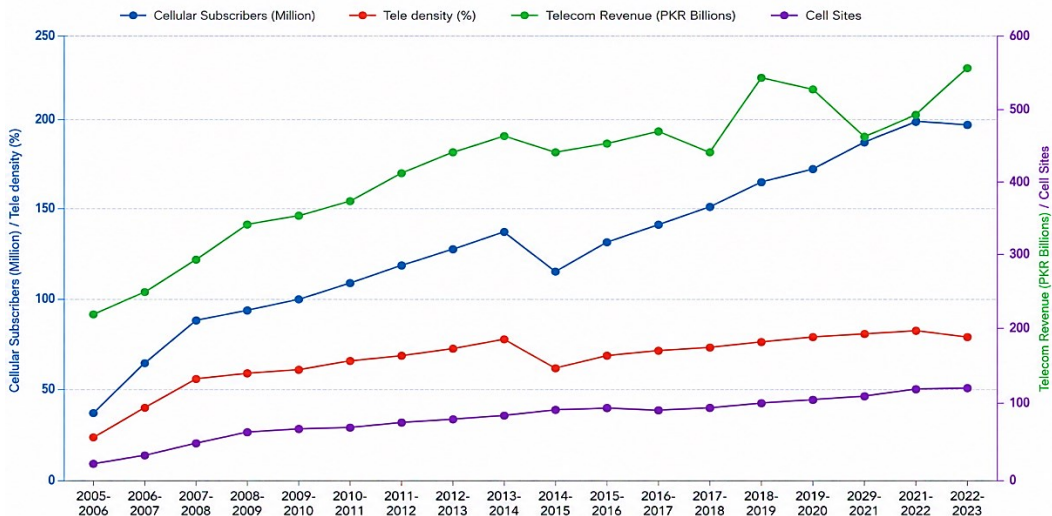


Figure 3: Pakistan Telecom Growth

4.5 Discussion

The findings indicate that the future growth of Pakistan's telecommunications industry largely depends on infrastructure modernization, technological innovation, and supportive regulatory reforms. The results presented in Table 2 and Figure 1 demonstrate that although the sector experienced substantial growth in subscribers, tele-density, revenue, and cell sites between 2005 and 2023, the pace of expansion slowed during certain periods due to economic and operational challenges. Respondents identified high taxation, currency devaluation, rising operational costs, and limited investment as major barriers affecting sustainable sector growth. These findings align with previous studies emphasizing that digital infrastructure development is strongly influenced by fiscal and regulatory policies.

Expanding advanced technologies such as 4G, 5G, and Fiber-optic networks is important for improving network capacity, speed, and reliability. Studies show that mobile and broadband use in Pakistan will likely keep growing, which means the need for modern digital infrastructure will also rise. To stay competitive and support the digital economy, Pakistan will need to invest in new technologies, upgrade its infrastructure, and encourage innovation. The survey shows that most respondents see comprehensive policy reforms as essential. They highlight the need for lower taxes, more flexible regulations, better infrastructure, and improved investment opportunities. Respondents also believe that reducing internet disruptions, supporting public-private partnerships, encouraging research and development, and offering subsidies for costs such as electricity could strengthen the telecom sector. In summary, sustainable growth in Pakistan's telecommunications industry will rely on balanced government policies, updated technology, and long-term investment plans.

5.0 CONCLUSION AND RECOMMENDATIONS

In conclusion, Pakistan's telecommunications industry has strong long-term growth potential, but ongoing economic, regulatory, and infrastructure challenges continue to hold it back. This study shows that high taxes, rising costs, policy uncertainty, low investment, and slow technology upgrades have all slowed the sector's progress and lowered investor confidence. However, with strong government support, clear regulatory reforms, modern infrastructure, and more investment in new technologies like 5G and fiber-optic networks, the telecom sector can grow steadily and offer better services. Improving digital infrastructure and encouraging innovation will make the industry more competitive and help drive Pakistan's economic growth and digital progress. This study has a relatively small sample size and focuses on specific views of Pakistan's telecommunications industry, which may limit the extent to which the results can be applied. Future research could use larger datasets, compare different regions, and apply quantitative models to better understand how regulatory policies, new technologies, and digital infrastructure shape the long-term growth of the telecom sector.

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